

## THE OLD WORLD SPECIES OF CALOPHYLLUM (GUTTIFERAE).

## 1. THE MASCARENE SPECIES

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THIS ACCOUNT OF the genus *Calophyllum* L. in the Mascarenes (Mauritius, Réunion, and Rodrigues) is necessary to establish the nomenclature of the species for the *Flore des Mascareignes* currently being prepared jointly by Kew, O.R.S.T.O.M. (Paris), and M.S.R.I. (Mauritius). The nomenclatural problems have been entirely disproportionate to the area covered and the number of species involved, and one name, *C. acuminatum* Lamarck, has been excluded from the genus (p. 181). It was hoped that a joint account of the Madagascan and Mascarene species could be prepared; however, the species of Madagascar have proved more complex than expected.

Although only three species of *Calophyllum* are native to the Mascarenes, they are of considerable interest; the species that are not found, but might be expected, are of almost equal interest. There are about 14 native species of *Calophyllum* on Madagascar, but none of these are native to the Mascarenes; however, both *C. inophyllum* L. and *C. recedens* Jumelle & H. Perr. seem to be related to the Mascarene species *C. taca-mahaca* Willd. *Calophyllum inophyllum*, perhaps rather surprisingly, does not appear to be native to the Mascarenes, although it is common in parts of Madagascar and is found in the archipelagoes between Madagascar and India. The two species endemic to Mauritius, *C. parviflorum* Baker and *C. eputamen* sp. nov., are unique in the genus in lacking any woody layer in the ripe fruit, although a thin woody layer is present in the immature fruit. Information on the germination and dispersal of these species would be of interest.

In the account that follows, the following abbreviations have been used for collections made as part of an institutional series: *SF* — Service Forestier (Madagascar) and *MAU* — Flora of Mauritius. Herbarium abbreviations follow those given by Holmgren and Keuken, *Index Herbariorum*, ed. 6, 1974; *REU* is used as an abbreviation for the "Herbier du Centre d'Enseignement Superieur Scientifique (la Réunion)."

## KEY TO THE TAXA OF CALOPHYLLUM IN THE MASCARENES

1. Tomentose indumentum on terminal bud, young stem, and base of the inflorescence; venation fine and dense; tepals 4. . . . . 4. *C. soulattri*.
1. Tomentose indumentum absent; venation not fine and dense; tepals 8 or more.
2. Lamina with 5-8(-10) veins/5 mm.; lowest internode of inflorescence usually less than 0.5 mm. long; fruit with a stone rounded at the apex. . . . . 2. *C. inophyllum*.



2. Lamina with (5-)7-15 veins/5 mm.; lowest internode of inflorescence usually 0.6-3 cm. long; fruit lacking a stone, or stone pointed at apex.
3. Lamina usually acute to acuminate; fruit with stone wall ca. 1 mm. thick. . . . . 5. *C. tacamahaca*.
3. Lamina usually rounded to retuse; fruit lacking a stone when mature.
4. Lamina 2.5-5.5(-7.5) cm. long; outer layer of fruit 0.4(-1) mm. thick. . . . . 3. *C. parviflorum*.
4. Lamina (5.7-)7-17.5 cm. long; outer layer of fruit (2-)3-3.5 mm. thick.
5. Terminal bud 4.5-7 mm. long; petiole 5-10 mm. long; lamina 5.7-10.5 cm. long. . . . . 1. *C. eputamen* var. *eputamen*.
5. Terminal bud 8-10 mm. long; petiole 8-15 mm. long; lamina (7-)9.5-17.5 cm. long. . . . . 1. *C. eputamen* var. *grandis*.

### 1. *Calophyllum eputamen* P. F. Stevens, sp. nov.

E speciebus aliis *Calophylli* (*C. parvifloro* excepto) in fructu maturo sine putamine differt, et a *C. parvifloro* in foliis maioribus (eis *C. parviflori* minus quam 7.5 cm. longis et 4.8 cm. latis), costa latioribus, floribus maioribus, et fructibus duplo maioribus stratis exterioribus (?2-)3-3.5 mm. crassis (in *C. parvifloro* solum circa 0.4(-1) mm. crasso) differt.

Arbor 5-6 m. alta trunco usque ad 30 cm. in diametro. Gemma terminalis corpulens, 4.5-7 mm. longa, indumento breve griseo tegenti compacto facienti praedita; ramulus haud vel leviter complanatus 2.5-5 mm. in transverso, 4-angulatus, glaber, in siccitate brunneus vel atrobrunneus; internodia 0.3-2 cm. longa. Petiolus 0.5-1.0 cm. longus et 3.5-5 mm. latus, supra late vadosaque concavus, infra convexus, glaber; lamina late obovata, elliptica vel subrotunda, raro ovata, 5.7-10.5 cm. longa et 3.9-8 cm. lata, apice rotundata vel retusa basi cuneata vel acuta in petiolo decurrens, maturitate glabra, coriacea, in siccitate utrinque flavo-brunnea vel griseo-brunnea, margine haud undulata plus minusve recurvata, costa utrinque e basi sensim angustata, plana vel leviter elevata, striata, (0.8-) 1.5-3 mm. lata in medio laminae, saepe circa 5 mm. ante apicem evanescenti, nervis lateralibus supra obscuris vel subprominulis infra prominulis elevatis 6-11 per 5 mm. sub angulo 60-70° e costa divergentibus. Inflorescentiae e axillis foliatis ortae, rarissime terminales, cum 9-17 floribus; axes 4.5-11 cm. longi, glabri, floribus infimis 0.5-3 cm. supra bases ortis, haud ramosi; bractee foliaceae late ovatae vel subrotundae, subpersistentes, 0.3-2 cm. longae, infra indumento subfurfuraceo praeditae; pedicellus 0.9-3.4 cm. longus, glaber. Flos hermaphroditus; tepala 8-12 (-13), duobus exterioribus subrotundis vel late ovatis 6.5-10 mm. longis et 5-9 mm. latis, glabris vel pilis brevibus fimbriatis, tepalis interioribus ellipticis vel obovatis 9-13 mm. longis et (1.5-)3.5-9 mm. latis (tepalis intimis multo parvioribus quam praesertim duobus exterioribus); stamina 270-410, filamentis usque ad 7.5 mm. longis basi usque ad 1 mm. connatis, antheris oblongis 1.3-2 mm. longis apicibus plus minusve truncatis; ovarium 2-2.7 mm. longum, glabrum; stylus 4-5.5 mm. longus; stigma peltata, 1.2-1.7 mm. in transverso, cum (2-)4 lobulis. Fructus ellipsoi-



deus vel ovoideus usque ad 4 cm. longus et 2.4 cm. latus interdum basi styli persistenti praeditus, in siccitate brunneus, rugosis subtilibus vadosis praeditus; stratum exterior (?2-)3-3.5 mm. crassum compactum (apice basique circa 7.5 crassum); strata lignosum et spongiosum nulla; embryo circa 2.2 cm. longus et 1.5 cm. latus.

TYPE: Mauritius, Pétrin, 600 m., 3 Dec. 1973, *Coode 4263* with *Guého & Badré* (holotype,  $\kappa$ ; isotype, A).

ADDITIONAL SPECIMENS SEEN. Mauritius: near Pétrin, *MAU 16666* coll. *Forestry Dept.* (MAU); Pétrin, ca. 450 m., *Coode 3951* with *Guého & Lorence* (A,  $\kappa$ ); Grand Bassin, *Vaughan s.n.* Jan. 1940 (MAU), *Colville s.n.* (E, 2 sheets), *anon.* ( $\kappa$ ); Plaine Sophie, Plaine Champagne, *MAU 27* (MAU); à l'est de la forêt de Maccabée, *28262 SF* coll. *Capuron* (P); Mare Longue-Maccabée Road, *MAU 13301* coll. *Vaughan* (MAU); track from Les Mares to Cocotte Mt., *MAU 10710* coll. *Vaughan* (MAU); *sine loco*, *Franco-British Exhibition* ( $\kappa$ ), *Commerson s.n.* (P, P-JU 11882), *Bouton s.n.* ( $\kappa$ ), *MAU 3054* coll. *Forestry Dept.* (MAU).

FIELD CHARACTERS. Bark light red-brown, fissured; inner bark red outside, paler pinkish straw toward the cambium. Latex yellow, clear.

ECOLOGY. *Calophyllum eputamen* var. *eputamen* grows in stunted forests and heathlands on very shallow soil in marshy conditions; it has been collected from altitudes of about 450 to 600 m. Specimens in flower have been collected from January to March, specimens in fruit in August and December. Fallen fruits are brown or black.

The leaves are sometimes galled, e.g., in *Coode 3951*. The galls are in a line ca. 0.5-1.3 cm. in from the edge of the leaf and consist of elliptic outgrowths from the surface of the lamina which sometimes distort the whole leaf.

LOCAL NAMES. "Tatamaka," "tatamaka à petites feuilles."

1a. *C. eputamen* var. *grandis* P. F. Stevens, var. nov.

Arbor circa 6 m. alta, trunco 12-20 cm. in diametro. Gemma terminalis 8-10 mm. longa; ramulus 3.5-6.5 mm. in transverso. Petiolus 0.8-1.5 cm. longus et circa 4 mm. latus; lamina elliptica, ovalis vel obovata, (7-)9.5-17.4 cm. longa et (3.3-)4.4-9.8 cm. lata, apice subretusa, rotundata vel obtusa, basi plus minusve decurrens, costa supra 0.9-2 mm. lata in medio laminae, infra plus minusve elevata, nervis 8-13 per 5 mm. sub angulo 65-75° e costa divergentibus. Fructus breviter ovoideus vel ellipsoideus, 2.4-3.5 cm. longus et 2-2.5 cm. latus. Aliter quam in var. *eputamen*.

TYPE: Mauritius, Bassin Blanc, 500 m., 6 Dec. 1973, *Coode 4290* with *Guého & Lorence* (holotype,  $\kappa$ ; isotype, A).

ADDITIONAL SPECIMENS SEEN. Mauritius: Bassin Blanc to Les Mares, 500 m., *Coode 4284* with *Guého & Lorence* (A); Grand Bassin, 716 m., *MAU 164* coll. *Vaughan* (MAU).



FIELD CHARACTERS. Bark yellow-gray, with vertical fissures 2.5–5 cm. apart when older; inner surface yellow-brown; under bark red, creamy under the cracks; inner bark salmon-pink, almost white near the cambium. Latex yellow, clear.

ECOLOGY. *Calophyllum eputamen* var. *grandis* is a sometimes common plant of valleys or of forests on windswept ridges, growing at altitudes of 500 to 720 meters. Regeneration is reported in disturbed valley forests. Fruiting specimens have been collected in December.

*Calophyllum eputamen* is related to *C. parviflorum*, differing most obviously in the larger size of all its parts, especially of the fruits (almost twice as large and with an outer layer about 5 times as thick). However, it should be noted that the description below of the ripe fruit of *C. parviflorum* is taken from a somewhat atypical specimen with very coriaceous leaves.

Four collections of *Calophyllum eputamen* var. *eputamen* which have habitat data mention that the plant was collected in swampy and marshy places. Var. *grandis* seems to grow in better drained places, and some of the differences between the two varieties may be directly caused by the environmental differences. Both varieties have the same very characteristic leaf and fruit type, and terminal inflorescences are also known from both varieties.

2. *Calophyllum inophyllum* L. Sp. Pl. 513. 1753; Bojer, Hort. Maurit. 51. 1837; Baker, Fl. Maurit. 16. 1877, *pro parte*. TYPE: description based on material from Ceylon.

*C. bintagor* Roxb. Hort. Bengal. 41. 1814; G. Don, Gen. Syst. 1: 622. 1831; Roxburgh, Fl. Ind. ed. 2. [W. Carey, ed.] 2: 607. 1832. TYPE: described from the Moluccas.

*C. calaba* auct. non L.; Lamarck, Encycl. Méth. Bot. 1: 553. 1785, *pro parte*.

Tree 4–10 m. tall. Terminal bud rather plump, 4.5–6 mm. long, with short, sometimes subfurfuraceous, grayish or brownish indumentum; twigs slightly flattened, 3–5.5 mm. across, with 4 or 6 raised lines when young, drying brown, glabrous; internodes (0.5–)1.5–2.5(–5) cm. long. Petiole 1–1.8 cm. long, broadly concave above, convex below, glabrous; lamina elliptic to oval, rarely ovate, 9.5–19 cm. long and 4.6–11.5 cm. across, rounded to slightly retuse at apex, sometimes subacute, acute to cuneate at base, glabrous,  $\pm$  chartaceous, drying greenish brown to brown above and below, margin slightly undulate, recurved, midrib above narrowing quickly near the base or gradually narrowed from the base, depressed, becoming  $\pm$  raised toward the apex, 0.4–0.8 mm. wide at the midpoint, raised below, angled toward the apex, striate toward the base, venation prominulous to prominent above and below, 5–8(–10) veins/5 mm., angle of divergence (65–)70–80°. Inflorescences from foliate axils, 7–13-flowered, axis 2.5–6.5 cm. long, glabrous except for minute puberulence near the base, basal internode 0.2–0.5(–0.9) cm. long, unbranched,



flowers not flabellate; bracts unknown, caducous; pedicels 1.5–5 cm. long. Flowers hermaphroditic; tepals 8, rarely 10, at least the outer fringed with short hairs, outer two broadly ovate to suborbicular, 5.5–7 mm. long and 4.5–7 mm. across, next pair elliptic to obovate, 9.5–11 mm. long and 6–7 mm. across, inner tepals  $\pm$  obovate, 10.5–14 mm. long and 3–5.5 mm. across; stamens 255–355, filaments to 7.5 mm. long, connate for up to 1.5 mm., anthers oblong, 1.2–2 mm. long, apex rounded to retuse; ovary 2–3 mm. tall, glabrous; style 6–9.5 mm. long; stigma peltate, 1–1.5 mm. across, not obviously lobed. Fruit subpyriform to spherical, ca. 2.5 cm. long and 2.2–2.5 cm. across, apex rounded to apiculate, drying grayish brown, rather densely and sharply wrinkled; outer layer detaching  $\pm$  cleanly from the stone, ca. 1 mm. thick,  $\pm$  compact (air spaces developing?); stone spherical to ellipsoid, 2.2–2.3 cm. long and 1.9–2.3 cm. across, apex rounded, walls ca. 1 mm. thick, smooth, unmarked; spongy layer prominent, to 2.7 mm. thick.

ADDITIONAL SPECIMENS SEEN. Mauritius: Baie du Cap, sea level, *Coode* 4011 with *Guého* (K); Baie du Tombeau, *MAU* 12560 coll. *Morin* (MAU); Port Louis, *Ayres s.n.* Dec. 1860 (GH, K); near Yemen Estate, Black River, *MAU* 1263 coll. *Vaughan* (MAU); Belle Mare Estate, 0.8 km. from the sea, *MAU* 12598 coll. *Rouillard* (MAU); "Riambel" near Souillac, *MAU* 11607 coll. *Antoine* (MAU); embouchure Riv. St. Gilles, *MAU* 96 (MAU); lowlands, *MAU* 16665 coll. *Morin* (MAU); *sine loco*, *Bouton s.n.* anno 1864 (K). Réunion: la place de l'Église de St. Paul, *Cadet* 4973 (K); littoral à St. Denis, *Cadet* 4914 (K); Ste. Marie, *Cadet* 5157 coll. *Etienne* (K). Rodrigues: above Port Mathurin, ca. 150 m., *Coode* 4299 (A, K); St. Gabriel, 300 m., *Cadet* 2778 (P); *sine loco*, *Bouton s.n.* (K), *Balfour s.n.* (BM, K).

ECOLOGY. *Calophyllum inophyllum* usually grows by the sea at low altitudes, although it may flourish inland when planted. Specimens in flower have been collected from December to March, a specimen in fruit in May.

LOCAL NAMES. "Takamaka de Madagascar" (Bojer, *loc. cit.*), "takamaka."

*Calophyllum inophyllum* is an easily recognizable species. It usually has a broad lamina with rather distant venation (5–8 veins/5 mm.), the twigs are stout, and the inflorescences bear flowers with long, slender pedicels. The grayish, sharply wrinkled, fallen fruits with their subspherical stones are a characteristic sight on the beaches where *C. inophyllum* grows.

The germination of the fruit of *C. inophyllum* in Australia and New Guinea has been described by Stevens (1974). Smith and Darwin (1974, fig. 6) included a good photograph of the characteristic fruit.

It is probable that *Calophyllum inophyllum* has been introduced in all three islands. Baker (*loc. cit.*) recorded it as being "common in the forests of the sea shore" on Mauritius, but this statement is belied by the paucity of the specimens from that area. Bojer (*loc. cit.*) noted that it was "presque naturalisée" on the island, and the local name that he gave for it, "takamaka de Madagascar," might suggest that it had been introduced



from Madagascar. Notes on several specimens suggest that the species is planted or growing in waste places (e.g., *Bouton s.n.* anno 1864, MAU 16665), although a note on MAU 96 suggests that it is native. All of the specimens cited from Réunion came from planted trees, and Coode 4249, from Rodrigues, also came from a tree which was apparently planted. *C. inophyllum* regenerates naturally in the Mascarenes, at least on Mauritius and Rodrigues.

*Calophyllum inophyllum* is common on Madagascar, being most abundant along the northern part of the east coast, and it appears to be represented by the small-fruited form described as *C. inophyllum* var. *takamaka* Fosberg. The little fruiting material seen from the Mascarenes also had rather small fruits. However, the fruits were not mature, lacking the plugs at the base of the stone which are found in ripe fruits throughout the range of the species (see also Stevens, 1974). Although *C. inophyllum* has larger fruits in the eastern part of its range, there is considerable variation in fruit size even there, and the immaturity of the fruits from the Mascarenes makes it impossible to suggest a place of origin for the Mascarene *C. inophyllum*.

*Calophyllum bintagor* is one of the names validly published in Roxburgh's *Hortus Bengalensis* (Robinson, 1912). In a footnote Roxburgh referred to "H. A. 2 t. 71" — the illustration of *Bintangor maritima* in Rumphius, *Herbarium Amboinense* 2: tab. 71. 1741. Later Roxburgh mentioned that Rumphius's illustration was a poor representation of his *C. bintagor* (Roxburgh, *loc. cit.* 1832). *Bintangor maritima* is to be equated with *C. inophyllum*.

There is a sterile specimen of *C. bintagor* Roxb. at the British Museum which agrees well with the description given by Roxburgh (*loc. cit.* 1832); this specimen is clearly *C. inophyllum*. On one sheet is written "*C. Bintangor*," and on another "N 10 1811 8.19," the three groups of figures being under one another. As this writing is comparable to that on the sheets of another Roxburgh collection (see *C. lanceolarium* Roxb. below), the specimen of *C. bintagor* almost certainly came from Roxburgh.

Roxburgh (*loc. cit.* 1814) mentioned that *Calophyllum bintagor* had been sent to him by one Monsieur Jannet in 1810 and that it had come from the Moluccas. Later the specimen was mentioned as coming from Mauritius (Roxburgh, *loc. cit.* 1832). This Monsieur Jannet would seem to have been a much-travelled gentleman, since he is recorded as having sent specimens to Roxburgh in 1810 from America (*Acer negundo* L.), the West Indies (*Malachra capitata*), the Moluccas (*C. bintagor*), as well as Mauritius (*C. lanceolarium*), and his travels during the following year also span the globe (Roxburgh, *op. cit.* 1814). The person in question is probably V. F. Jaunet, who lived a long and checkered life on Mauritius (he ended up planting tea, but was ruined when governmental assistance was discontinued, and died at Port Louis in 1861). Presumably the material he sent was from the Botanic Garden in Mauritius, but although he is supposed to have sent plants to the Muséum d'Histoire Naturelle at Paris, I have not seen any material of *Calophyllum* there



collected by him. It may well be that the initial mention of the Moluccas as the source of the plants of *C. bintagor* is correct, since the status of *C. inophyllum* on Mauritius is at best doubtful.

3. *Calophyllum parviflorum* Bojer ex Baker, Fl. Maurit. 16. 1877; *C. tacamahaca* Willd. var. *parviflorum* (Bojer ex Baker) Vesque in DC. Monogr. Phanerog. 8: 548. 1893. TYPE: Mauritius, herb. *Justice Blackburn* (lectotype, K).

*C. spurium* auct. non Choisy; Bojer, Hort. Maurit. 52. 1837.

Shrub or tree 1.5–5 m. tall to 23 cm. d.b.h. Terminal bud hardly flattened, 4–6 mm. long, with short, gray-brown indumentum forming a compact dense covering; twig not or hardly flattened, 1–3 mm. across, with 4 or 6 raised lines, drying brown to dark brown, when young with sparse brownish subfarinose indumentum, glabrescent; internodes 0.2–1 cm. long. Petiole 3–7 mm. long, 1–2 mm. wide, broadly concave above, convex below, soon glabrescent; lamina elliptic to oval or obovate, 2–5.5 (–7.5) cm. long and 1.3–3.5 (–4.8) cm. across (leaves of saplings oval to oblong, to 11.2 cm. long and 3.5 cm. across), rounded to bluntly pointed at apex, rounded to cuneate or subtruncate at base, soon glabrescent apart from a few subpersistent small brown hairs on the midrib below, coriaceous, drying greenish brown to brown above and below, margin slightly recurved, hardly undulate, midrib above gradually narrowed from the base, flat to somewhat depressed, 0.3–1 mm. across at the midpoint, becoming slightly raised near the top, raised below,  $\pm$  angled in the top part, substriate near the base, venation subobscure above, prominulous below, slightly raised, 8–15 veins/5 mm., angle of divergence ca.  $60^\circ$ . Inflorescences from foliate axils, very rarely terminal, 5–11-flowered; axis 0.5–7.5 cm. long, glabrous or almost so, basal internode (0.3–)1–2.5 cm. long, unbranched; bracts often foliaceous, ovate to obovate, 1.5–10 mm. long, caducous to subpersistent; pedicels 4–17 mm. long, glabrous. Flowers hermaphroditic; tepals 8–12, glabrous or fringed with short hairs, outer two suborbicular to elliptic, 4.5–6 mm. long and 4–5.5 mm. across, next two (when more than 8) ca. 5.5 mm. long and 3.5–4.3 mm. across, inner tepals  $\pm$  elliptic, 7–9.5 mm. long and 2.5–5 mm. across; stamens 85–255 (–320), filaments to 3.5 mm. long, connate for up to 0.6 mm., anthers suboblong, 0.6–1.3 mm. long, apex rounded to retuse; ovary 1.3–2.5 mm. long, glabrous; style 2–3.5 mm. long; stigma peltate, 0.7–1.3 mm. across, 1–3-radiate. Fruit ellipsoid, ca. 2.5 cm. long and 1.2 cm. across,  $\pm$  beaked, beak to 7 mm. long, sharply pointed, drying smooth, brown; outer layer ca. 0.4 mm. across, compact; stony layer absent; spongy layer absent; seed ca. 1.5 cm. long and 1 cm. across.

ADDITIONAL SPECIMENS SEEN. Mauritius: Bel Ombre, near S.W. coast, ca. 240 m., *Coode* 4057 with *Julien & Guého* (A, K), ca. 240 m., *Coode* 4059 with *Julien & Guého* (A, K), ca. 250 m., *Coode s.n.* 14 Nov. 1973 (K); vers Cascade Alexandra, *Friedmann* 2667 (K); Alexandra Falls, ca. 650 m., *Coode* 4678 (K); Plaine Champagne, 660 m., *Coode* 4450B with *Guého & Lorence* (A, K),



660 m., Coode 4452 with Guého & Lorence (A, K), Friedmann 1177 (P); Plaine Champagne road, near turning to Mt. Cocotte path, MAU 12521 coll. Lalouette (MAU); Crown Lands Combo, Coode 4105 coll. Forestry Dept. (A, K); Pétrin, 655 m., MAU 16671 coll. Vaughan (MAU); Crown Land Florin on Mare Longue Plateau, MAU 15475 coll. Guého (K, MAU); Black River gorges, MAU 16757 coll. Lorence (MAU); Montagne Blanche, Bouton s.n. (K, *pro parte*); Kanaka, Curepipe, MAU 101 coll. Bijoux (MAU), MAU 104 coll. Lanémillante (MAU); *sine loco*, Horne s.n. (K), Franco-British Exhibition (K); *ibid.* (uplands or hill forest), MAU 98, 99, 100, 102, 103, 197, 16670 (all MAU).

FIELD CHARACTERS. Outer bark yellow when young, becoming pink and gray with vertical pustular lenticellar lines, finally becoming fissured; under surface bright orange-brown to deep brown; under bark salmon to dark red-brown; inner bark paler pinkish brown. Latex yellow, clear. Young leaves yellowish in color.

ECOLOGY. *Calophyllum parviflorum* is common in colline forests and shrubbery, sometimes rather exposed, and has been found at altitudes of 240 to 660 meters. Specimens in flower have been collected in February, March, and from July to September; a specimen in fruit was found in December.

LOCAL NAME. "Tatamaka à petites feuilles."

*Calophyllum parviflorum* is characterized by its rather small leaves, which have a broad sunken midrib on the upper surface, and by its beaked and/or sharply pointed fruits, which have a thin, compact, outer layer and entirely lack a woody layer, at least when mature (see below).

There are four shoots on two sheets in the type folder of *C. parviflorum* at Kew; none of the four elements are annotated by Baker. The flowering specimen from Justice Blackburn's herbarium is selected as the type. It agrees fairly well with Baker's description of the leaves ("2-3 in. long, very rigid, obovate with a cuneate base and very short petiole"), and its flowers have eight tepals; Baker describes the flower as having four petals. On the same sheet is a specimen collected by Horne, on which Baker seems to have based his description of the fruit ("oblong,  $\frac{3}{4}$  in. long, with a very distinct beak"). The specimen from Blackburn's herbarium agrees fairly well in foliar characters with the other specimens cited here; that collected by Horne agrees less well, having very rigid leaves (but cf. Baker's description). My description of the fruits of *C. parviflorum* is based on Horne's specimen, but young fruits of specimens more typical in foliar characters are also sharply pointed and are probably of the same type (see below).

On the other sheet the two elements have but a single label and were collected by M. Bouton. On the label is written "vulgo: Tatamaka petite feuille à limbes," perhaps the source of Baker's local name, "Tatamaka à petites feuilles." However, neither specimen is selected as the type, since both have rather large flowers, usually with more than eight tepals. One specimen, belonging to *C. eputamen*, has leaves up to 9 cm. (some-



what over 3 in.) long; the other, perhaps to be referred to *C. spectabile* sensu stricto, has very clearly petiolate leaves.

The specimens cited agree well with each other, differences in the persistence of the foliaceous bracts being unimportant. *Friedmann 2667* has terminal inflorescences, but it is otherwise unremarkable. Only a single collection (*Horne s.n.*) has ripe fruit, and further collections are much needed to clarify the variation found in the immature fruits. Some collections, e.g., *MAU 100* and *MAU 16757*, have a distinct, albeit very thin, woody layer; the fruits of the latter specimen are up to 3.7 cm. long. *Coode 4678* has ellipsoid fruits only 1.7 cm. long and 7 mm. across, which quite lack a woody layer; the outer layer of the fruit is ca. 1 mm. across and is almost areolate because of the prominent latex canals. In the other specimens with fruits (including *Horne s.n.*), the outer layer is thinner and somewhat fibrous, although there are also prominent latex canals.

Although clearly related to *Calophyllum eputamen*, *C. parviflorum* can usually be easily distinguished from it (see the former species). There are two specimens which are somewhat intermediate. *MAU 15475* has rather large leaves and flowers with very numerous stamens (see the upper limits of the measurements in the description). However, its immature fruits have a very thin outer layer, and its flowers are not very large. *MAU 16670* has a broadly elliptic lamina which is very rigid and dries chestnut brown in color. However, the lamina is not very large, and it is much broader than that of *Horne s.n.*, the only other specimen with a comparably rigid lamina.

*Calophyllum parviflorum* has been reported from Madagascar (see Perrier de la Bâthie, 1951). However, the specimens on which this report was based have a thick woody layer in the fruit and leaves lacking the broad, sunken midrib of *C. parviflorum*; these specimens represent an undescribed species. *C. tacamahaca*, to which Vesque (*loc. cit.*) reduced *C. parviflorum* (as a variety) because of the similarity in the shape of their fruits, also has a woody layer in the fruit. In addition, it has a lamina which is acute at the apex and which has a less obviously sunken midrib than that of *C. parviflorum*.

4. *Calophyllum soulattri* Burm. f. Fl. Ind. 2: 121. 1768. TYPE: described from Java.

Tree. Terminal bud flattened-conoid, 8–12 mm. long, brown-tomentose; twigs flattened, 3–4.5 mm. across, with 4–6 raised lines, rather quickly becoming rounded, drying rather light brown, tomentose when young (hairs ca. 0.7 mm. long), glabrescent; internodes 2.5–8.5 cm. long. Petiole 1.1–1.6 cm. long, narrowly concave above, convex below, tomentose below, at least when young; lamina ovate to oblong, 11–23 cm. long and 3.2–7.4 cm. across, gradually narrowed to the acute apex, or subacuminate, cuneate to broadly cuneate at base, glabrous apart from a few persistent hairs on the midrib below, subcoriaceous, drying dull greenish brown on



both surfaces, margin undulate, slightly and narrowly recurved, midrib above abruptly narrowed at the base, raised, 0.2–0.35 mm. wide at the midpoint, below prominent, raised, striate, or angled toward the base, venation prominulous above and below, raised, 10–15 veins/5 mm., angle of divergence 65–70°. Inflorescences axillary, 9–17-flowered, axis to 3.6 cm. long, tomentose at the base, otherwise almost glabrous, basal internode 0–2 mm. long, flowers flabellate, branches to 1.7 cm. long, each 5-flowered; bracts unknown; pedicels 1.5–2.6 cm. long, glabrous, slender. Flowers hermaphroditic; tepals 4, abnormally 5, sparsely fringed with short hairs, the two outer broadly ovate, 5.5–6.5 mm. long, the inner tepals subelliptic, 7.5–8 mm. long and 2.5–5.5 mm. across; stamens 55–100, filaments to 3 mm. long, connate at the very base, anthers oblong, 1.3–2.2 mm. long, apex  $\pm$  retuse; ovary ca. 1.5 mm. long, glabrous; style 2.5–3.5 mm. long; stigma peltate, 1–1.3 mm. across, not obviously lobed. Fruit spherical to broadly ovoid, ca. 11 mm. long and 10 mm. across, sometimes apiculate by the style base, drying brown,  $\pm$  smooth; outer layer detaching from the stone, 0.8–1.4 mm. across,  $\pm$  compact, but air spaces developing under the skin, not dense; stone ellipsoid, ca. 8 mm. long and 6.5 mm. across, apiculate, walls ca. 0.4 mm. across, smooth, unmarked; spongy layer thin.

SPECIMENS SEEN. Mauritius: Jardin de Maurice, *Richard s.n.* (P); Jardin de Pamplémousses, *Boivin s.n.* (P), MAU 3040 coll. *Delord* (MAU), MAU 10748 coll. *Guého* (MAU), *Andersson s.n.* March, 1853 (MAU), *anon.* (K); *sine loco*, *Richard 416* (P, *pro parte*), *Bouton s.n.* (K), *De Montbrison s.n.* (FI). Réunion: hauts de Bras-Panon (la Caroline), 200 m., *Cadet 4893* (K).

ECOLOGY. *Calophyllum soulattri* grows in waste places or where the vegetation has been disturbed; it has been found at an altitude of 200 meters. Specimens in flower have been collected in March, a specimen in fruit in October.

LOCAL NAME. "Mangue à grappe" (Réunion).

*Calophyllum soulattri* is a very distinctive species characterized by its thinly coriaceous lamina, which dries dull greenish brown and has dense, fine venation. The inflorescence, with its short basal internode, relatively long lateral branches, and flabellate flowers, is also distinctive. *C. soulattri* is the only species in the Madagascar/Mascarene area which has flowers with four tepals.

*Calophyllum soulattri* is possibly naturalized in Mauritius; it is rare outside the Botanic Garden at Pamplémousses (MAU 10748). P. Rivals notes on MAU 3040 that *C. soulattri* is naturalized at Ste. Suzanne on Réunion. *C. soulattri* may also be naturalized on Madagascar, but I have seen only two specimens from there (*Bréon s.n.* (P) and *anon.* (MEL 62306)), most of the specimens cited under *C. spectabile* (auct. non Willd., = *C. soulattri*) by Perrier de la Bâthie (1951) belonging to other species.

Perrier de la Bâthie (1951) thought that *Calophyllum soulattri* had



been introduced into Madagascar and the Mascarenes from India. *Calophyllum soulattri* is not native in either India or Ceylon, and it was probably introduced from the Malesian region.

5. *Calophyllum tacamahaca* Willd. Sitzungsber. Ges. Naturf. Fr. Berlin Mag. 5: 79. 1811; Choisy, Mém. Soc. Hist. Nat. Paris 1: 228. 1823; Choisy in DC. Prodr. 1: 562. 1824, *pro parte* Bourbon; Sprengel, Syst. Veg. ed. 16. 2: 571. 1825; Cambess. Mém. Mus. Hist. Nat. Paris 16: *pl.* 17C. 1828; G. Don, Gen. Syst. 1: 622. 1831, *pro maj. parte*; Bojer, Hort. Maurit. 52. 1837; Wight, Ill. Ind. Bot. 1: 128. 1840; Choisy, Mém. Soc. Phys. Hist. Nat. Genève 12: 423. 1851, *pro parte* Mascarenes; Planchon & Triana, Ann. Sci. Nat. Bot. IV. 15: 286. 1861; Vesque, Epharמושis 2: *tab.* 2. 1889; Vesque in DC. Monogr. Phanerog. 8: 547. 1893, *pro parte* Mascarenes; Cordemoy, Fl. Île Réunion 333. 1895. TYPE: Bourbon [Réunion], *du Petit-Thouars s.n.* (holotype, B, herb. Willd. 10115).

*C. spectabile* Willd. Sitzungsber. Ges. Naturf. Fr. Berlin Mag. 5: 79. 1811; Choisy, Mém. Soc. Hist. Nat. Paris 1: 228. 1823; Choisy in DC. Prodr. 1: 562. 1824, *pro parte* Mauritius; Sprengel, Syst. Veg. ed. 16. 2: 571. 1825; G. Don, Gen. Syst. 1: 622. 1831, *pro parte*; Bojer, Hort. Maurit. 52. 1837. TYPE: Île de France [Mauritius], *du Petit-Thouars s.n.* (holotype, B, herb. Willd. 10116).

*C. lanceolatum* Bl. Bijdr. 4: 217. 1825; Miq. Fl. Ind. Bat. 1(2): 511. 1859. TYPE: described from cultivated material originating from Mauritius.

*C. lanceolarium* Roxb. Fl. Ind. ed. 2. [W. Carey, ed.] 2: 608. 1832; Roxb. Hort. Bengal. 41. 1814 et G. Don, Gen. Syst. 1: 623. 1831, *nomina*; Hooker & Arnott, Bot. Beech. Voy. 173. 1833; Wight, Ill. Ind. Bot. 1: 129. 1840. TYPE: described from cultivated material originating from Mauritius (BM).

*C. inophyllum* auct. non L.; Lamarck, Encycl. Méth. Bot. 1: 552. 1785, *pro parte* Mascarenes; Baker, Fl. Maurit. 16. 1877, *pro syn.*

Tree 10–15 m. tall, to 25 cm. d.b.h. Terminal bud plump, 4–8 mm. long, with short furfuraceous gray to brown indumentum; twigs hardly flattened, 1.5–3.5 mm. across,  $\pm$  4-angled at first, soon with a variable number of raised lines, young twigs drying brown to dark brown, slightly older twigs grayish brown, glabrous or with sparse brown farinose indumentum when young; internodes 0.5–2.7(–4.5) cm. long. Petiole (0.7–) 1.1–2.5 cm. long, 1.3–3 mm. wide,  $\pm$  V-shaped above, convex below, glabrous when mature; lamina elliptic, sometimes ovate to suboblong, (6.3–) 8–18.8 cm. long and (2–)3.4–5.5(–6.8) cm. across,  $\pm$  acute at apex, very rarely subrounded, (broadly) cuneate to acute at base, sometimes narrowly decurrent, glabrous, or rarely with subpersistent brown farinose indumentum on the midrib below, chartaceous to subcoriaceous, usually drying greenish brown above and below, with light brown margins and midrib,  $\pm$  shiny, rarely dark brown on both surfaces, margin undulate, slightly recurved, midrib above gradually narrowed from the base, de-



pressed, 0.3–1.0 mm. across at the midpoint, becoming raised toward the apex, below raised,  $\pm$  striate, venation prominulous above and below, raised, (5–)7–12 veins/5 mm., angle of divergence 60–80°. Inflorescences from foliate axils, 7–many-flowered, axis 3–11 cm. long, glabrous or with sparse farinose indumentum on the lowest internode, basal internode (0.2–)0.6–2.6 cm. long, usually unbranched, rarely with 3-flowered branches to 2 cm. long; bracts unknown; pedicels (0.6–)1.3–2.1 cm. long, glabrous or almost so. Flowers hermaphroditic; tepals 7–9, fringed with short hairs, the two outer tepals broadly ovate, 7.5–11 mm. long and 6.5–9.5 mm. across, thick, concave, inner tepals 11–17 mm. long and 4.5–9 mm. across; stamens 200–355, filaments to 7 mm. long, connate for up to 1 mm., anthers oblong, 1.5–1.9 mm. long, apex  $\pm$  retuse; ovary 2–3 mm. long, glabrous; style 4.5–5 mm. long; stigma peltate, ca. 1.1 mm. across, 3–4-lobed. Fruit ovoid, 3.7–4.3 cm. long and 2–2.3(–3.7) cm. across,  $\pm$  sharply pointed at apex, drying grayish to light brown, deeply and sharply wrinkled; outer layer 2.5–4 mm. thick, compact and rather hard; stone ovoid to ellipsoid, 1.8–2.6(–3.1) cm. long and 1.4–2.1(–2.5) cm. across, pointed at apex, wall 0.9–1.5 mm. thick, smooth and unmarked, with a plug 4(–8?) mm. across; spongy layer rather prominent(?), up to 1 mm. thick.

ADDITIONAL SPECIMENS SEEN. Mauritius: Deux Mamelles near Pieter Both, 510 m., Coode 4361 with Guého & Lorence (somewhat similar to *C. parviflorum*; A, K); Montagne Blanche, etc. Bouton s.n. (K, pro parte); Bel Ombre, ca. 250 m., Coode s.n. 14 Nov. 1973 (fragmentary collection, A, K); Mt. Saint Pierre, Barclay 1711 (K); Plaine Lièvre, near road to Brise Fer, MAU 14546 coll. Edgerley (MAU); Crown Land Dangnell, near Port Louis, ca. 60 m., MAU V/3160 coll. Vaughan (MAU); Crown Land Vuilliman, near "Piton de Milieu," MAU 1385 coll. Vaughan (MAU), MAU 16668 coll. Edgerley (MAU); Crown Land Cabinet, MAU 57 coll. Duljeet (MAU); halfway down new Cabinet Magenta Road, 240 m., MAU 65 coll. Duljeet (MAU); near Crown Land Rivière, Tamarin Falls, MAU 16669 coll. Vaughan (MAU); in sylvis vastis, Bojer s.n. (K); sine loco, Sieber Fl. Maurit. 2, 110 (B, BM, K, P), S[ieber] Fl. Mixta 116 (E), Commerson 149 (P), Commerson s.n. (BM, C, P, P–JU 11883), Bouton s.n. (K, pro parte), Hornemann s.n. (C), MAU 1645, 2851, 3032 (all MAU). Réunion: Mare Longue, near St. Philippe, 500–600 m., Coode 4174 with Cadet & Badré (A, K), 500–600 m., Coode 4175 with Cadet & Badré (A, K), 28175 SF coll. Capuron (P), Maillot & Jules 3 (P), 100 m., Cadet 3793 (REU), 400 m., Cadet 3844bis (REU); route de Tacamaca, 500 m., Friedmann 1548 (P); la Montagne, 600 m., Cadet 613 (REU); Tremblet, near sea level, Coode 4966 with Cadet (K), St. Philippe, Cadet 563 (REU); hauts de Bras-Panon (la Caroline), 400 m., Cadet 4812 (REU); route National entre Basse Vallée et Vincendo (St. Philippe), 100 m., Cadet 3521 (K); Passim, Cordemoy s.n. (P); sine loco, Cordemoy s.n. (P), Commerson s.n. (P, P–JU 11881), Labillardière s.n. (FI, pro parte). Mascarenes(?): sine loco, herb. Schumacher, comm. Jussieu (C).

FIELD CHARACTERS. Outer bark smooth, yellowish or gray in patches, brown on the under surface; under bark brownish red; inner bark pink, paler toward the cambium. Latex yellow, clear, that from cut leaves white. (Details from Coode 4174.)



ECOLOGY. *Calophyllum tacamahaca* usually grows in colline habitats, sometimes on rocks (e.g., *Barclay 1711*, from Mauritius) or on recent lava flows (e.g., *Maillot & Jules 3*, from Réunion); it has been collected at altitudes of (0-)100 to 600(-900) meters. It may grow in drier places than *C. eputamen* and *C. parviflorum*, although on Réunion it occurs in the wettest place in the lowlands, which is wetter than anywhere on Mauritius (Coode, pers. comm.). It has several times been collected from disturbed or secondary vegetation. Flowering specimens have been collected in February and March, and flowering is reported in April and May as well by Bojer (*loc. cit.*); fruiting specimens have been collected in May, October, and November. According to the field notes on *Maillot & Jules 3*, the fruits have the taste of apricots.

*Coode 4174* has galled leaves; the galls are pustular outgrowths of the lamina, sometimes completely deforming it.

GERMINATION. The radical emerges just to one side of the basal plug, the stone where it emerges being about half the thickness of the rest of the wall. The basal plug is pushed out, and the area of thin stone lost during germination is of similar size and shape to that of the basal plug and may also be delimited by a line of weakness. Three, four, or five pairs of seedling leaves are produced, each pair separated by internodes (0.5-)1-4 cm. long. The lowest pair of leaves, which is probably sometimes reduced, had been lost in two of the five seedlings seen. The seedling has a prominently 4-angled stem. (Details from *Coode 4175* and *MAU 2851*.)

LOCAL NAMES AND USES. "Tatamaca," "tatamaca rouge," "tatamaca des hauts." *Calophyllum tacamahaca* is a useful timber species.

*Calophyllum tacamahaca* is probably related to *C. inophyllum*, from which it can be separated by its relatively longer terminal bud and narrower twigs with shorter internodes, by its more narrowly elliptic or ovate lamina with an acute apex and a midrib narrowing only gradually from the base, and by its shorter pedicels, pointed fruits, etc. (see TABLE 1). The fruits of both species dry sharply wrinkled and pale in color, and the method of germination described above for *C. tacamahaca* is very similar to that described for *C. inophyllum* (Stevens, 1974). Planchon and Triana (*loc. cit.*) discuss the early history of the confusion between the two species. It has been suggested that *C. tacamahaca* is no more than a variety of *C. inophyllum* (Baker, *loc. cit.*; Vesque, *loc. cit.* 1893; Perrier de la Bâthie, 1951), but the differences noted above readily separate the two.

Numerous fruiting collections of *Calophyllum inophyllum* from all over its range have been examined, and in nearly all the stone is spherical and rounded at the apex (and base), although the fruits themselves may have a stipe over 1 cm. long or be prominently pointed at the apex. A few collections have slightly elongated stones, but the apex is rounded; only one collection examined, *bb 29896* (Forest Research Institute, Buitenzorg), from the Moluccas, had an apiculate stone. The somewhat



unfortunately named *C. inophyllum* var. *takamaka* Fosberg, from Aldabra, agrees with typical *C. inophyllum* in all the respects discussed above. *Calophyllum inophyllum* characteristically has a plug at the base of the stone.

*Calophyllum tacamahaca* is also closely related to *C. recedens* Jumelle & H. Perr., from Madagascar. That species has more slender twigs, leaves which have rather denser venation and which are acuminate at the apex and often attenuate/decurrent at the base, narrow tepals, and smaller fruits with stones less than 0.7 mm. thick (TABLE 1). As these are not great differences, further studies are needed to establish the rank of *C. recedens*.

TABLE 1. Comparison of *Calophyllum inophyllum* with *C. tacamahaca* and *C. recedens*.

	<i>C. inophyllum</i>	<i>C. tacamahaca</i>	<i>C. recedens</i>
Color of older twigs when dry	mid-brown	grayish brown	mid-brown
Twig width (mm.)	3-5.5	1.5-3.5	1.5-2.8
Lamina apex	rounded	± acute (-sub-rounded)	acuminate
Midrib on upper surface — width at midpoint (mm.)	0.4-0.8	0.3-1	0.2-0.35
Venation density (veins/5 mm.)	5-8(-10)	(5-)7-12	8-18
Lowest internode of inflorescence (cm.)	0.2-0.5(-0.9)	(0.2-)0.6-2.6	0.7-1.7
Pedice! length (cm.)	1.5-5	(0.6-)1.3-2.1	0.7-2
Fruit shape	spherical to ellipsoid	ovoid	ovoid to ellipsoid
Thickness of outer layer (mm.)	1.9-2.3	2.5-4	1.6-2.5
Apex of stone	rounded	obtusely pointed	rounded to mucronate
Stone thickness (mm.)	ca. 1	0.9-1.5	0.3-0.6

The synonymy given above for *Calophyllum tacamahaca* is not definite. The type specimen of *C. tacamahaca*, collected on Réunion, has narrow petioles and a rather small, rigid lamina which has dried a greenish brown. It represents the common form of the species. The type of *C. spectabile* (from Mauritius) has rather thinner, larger leaves which have dried a dark brown, and it is similar in this respect to *Maillet & Jules 3*, from Réunion. Other dark-drying specimens are more like typical specimens of *C. tacamahaca*. The equation of *C. spectabile* with *C. soulattri* Burm. f. would appear to stem from Willdenow's suggestion that Rumphius's *Bintangor sylvestris* (= *C. soulattri*) was the same as *C. spectabile*; this has been discussed on p. 182.



The original description of *Calophyllum lanceolatum* Bl. reads "ramulis 4-aèdris, foliis oblongo-lanceolatis obtusis basi acutis." It was based on material grown at Buitenzorg which originated from Mauritius, and it seems to represent a specimen similar to that on which *C. lanceolarium* Roxb. was based.

There is a specimen of *Calophyllum lanceolarium* Roxb. at BM which is probably a type. On one sheet is written "*C. lanceolaria*" and "1811," with "x 19" below the 1811, and on another sheet is written "(illegible) Jannet." Roxburgh (*loc. cit.* 1814) refers to Monsieur Jannet (see the discussion under *C. inophyllum* above) as having sent this species to Calcutta in 1810. The specimen at BM agrees with the description of *C. lanceolarium*; it is possibly a sapling of *C. tacamahaca*, having short, branched hairs on the terminal bud like those of that species. Two specimens from Réunion, *Cadet 613* and *Cadet 4812*, have especially prominently angled stems; both were collected from small individuals (*Cadet 613* — "arbuste de sous-bois"; *Cadet 4812* — "un rejet"). The seedlings of *C. tacamahaca* also have prominently angled stems. Although the specimen of *C. lanceolarium* at BM also looks like *C. apetalum* Willd., an Indian species, the hairs on the terminal bud seem to be only rarely branched in the latter species.

Most of the specimens assigned to *Calophyllum tacamahaca* from both Mauritius and Réunion are similar and match the type of *C. tacamahaca*. However, specimens with broader petioles are common on Réunion but very rare on Mauritius. Similar fruits are associated with specimens matching the types of both *C. tacamahaca* and *C. spectabile*, as well as with the broad-petioled specimens from Réunion.

Fruits preserved in formalin have been seen (*Cadet 3793* and *Cadet 3844bis*). (Leaves associated with these specimens have not been seen.) Although the fruits of *Cadet 3844bis* are immature, in both specimens the stones are acute at the apex. The fruits of *Cadet 3793* are ovoid, ca. 4.3 cm. long and 3.7 cm. across, and the surface is smooth. The outer layer is ca. 5 mm. thick, and the stone, which is ca. 3.1 cm. long, 2.5 cm. across, and slightly larger than those of the other specimens seen (cf. the description), has walls 1.3–1.5 mm. thick.

*MAU 14546* has fruits similar to those characteristic of the species. Although they are less deeply wrinkled (owing to their immaturity), they have a prominent woody layer. However, the leaves are more coriaceous, the apex of the lamina is subrounded, the midrib is prominent, and the petiole is broad; as a result, the specimen approaches *C. eputamen* in appearance.

#### THE IDENTITY OF CALOPHYLLUM ACUMINATUM

*Calophyllum acuminatum* Lamarck, Encycl. Méth. Bot. 1: 553. 1785.

The description of this species reads "CALOPHYLLUM acuminé, *Calophyllum acuminatum*. *Calophyllum foliis ovato-oblongis, acutis, fructibus*



*ovatis acuminatis*. N. *Bintangor sylvestris*. Rumph. Amb. 2. p. 216. Tab. 72?" This description was based on dried material, as the mention "*v. s. en fr.*" at the end of the protologue confirms.

The specimen of *Calophyllum acuminatum* in Lamarck's herbarium at Paris contains two elements, a leafy shoot of a species of *Garcinia* and a fruit of a species of *Calophyllum* cut longitudinally. Lamarck's discussion makes it probable that these are the elements on which he based his *C. acuminatum*. He mentions the dull leaves of *C. acuminatum* with "*ner-vures moins fines*" (hence with more distance between the veins) than in those of *C. inophyllum* and *C. calaba*. His interpretation of these two latter species was unusual, but in his herbarium there is material of both of these as they are currently interpreted. There is also material to be referred to *C. tacamahaca*, which he included in his concept of *C. inophyllum*. The leaves of the shoot of *Garcinia* are dull, with venation more distant than that of the species of *Calophyllum* mentioned (as might be expected of a species of *Garcinia*). The fruit on the sheet is sharply pointed at the apex and has a prominent and hard woody layer, agreeing well with Lamarck's statement "*ses fruits sont des noix ovales et acuminées.*"

*Calophyllum acuminatum*, when it has been mentioned at all, has generally been included in the synonymy of *C. soulattri* Burm. f. or of *C. spectabile* auct. non Willd. The reason for this seems to be Lamarck's mention of Rumphius's *Bintangor sylvestris* after his description of *C. acuminatum*; Willdenow made a similar hesitant reference to *Bintangor sylvestris* in his description of *C. spectabile*, where he also equated *C. spectabile* with *C. acuminatum* ("*scheint Lamarck's C. acuminatum dieselbe Pflanze zu sein*"), so again leading back to *Bintangor sylvestris*. Choisy also thought that the three species of *Calophyllum* might be the same (see, for example, 1824). Hasskarl (Abh. Naturf. Ges. Halle 9: 184. 1866), in his interpretation of Rumphius's names, equated *Bintangor sylvestris* with *C. acuminatum*, *C. soulattri* and *C. spectabile* being synonyms. However, the fruits of *Bintangor sylvestris* (*C. soulattri* Burm. f.) are often subspherical and dry dark in color; the stone is thin, usually less than 0.4 mm. thick. Planchon and Triana (1861) inadvertently omitted any mention of *C. acuminatum* Lamarck, although they did include a later homonym, *C. acuminatum* Willd., which is a species of *Rheedia*. Vesque (1893), the last monographer of *Calophyllum*, also made no mention of *C. acuminatum* Lamarck. Another result of all this confusion was that the name *C. spectabile* was used fairly generally until about 1950 for the taxon properly called *C. soulattri*; not only are the two names not synonymous, but *C. soulattri*, the earlier name, was often cited as a synonym of *C. spectabile*.

Since Lamarck distinguished *Calophyllum acuminatum* from other species of the genus on vegetative characters which were taken from the shoot of *Garcinia*, it is proposed that *C. acuminatum* be typified by the leafy shoot. The epithet "*acuminata*" is already occupied in *Garcinia* (*G. acuminata* Planchon & Triana), and my knowledge of this difficult genus is too poor to suggest to which species the leafy element of *C. acuminatum*



might belong. *Calophyllum acuminatum* was supposed to come from Java and the Moluccas, and if Lamarck was correct in this and not confused by his reference to Rumphius, the leafy shoot may come from this region (see below).

The fruit of *Calophyllum acuminatum*, with its sharply pointed apex, seems to have suggested Lamarck's specific epithet. The fruit probably comes from what is properly called *C. tacamahaca*, a Mascarene species(!). However, the fruiting element of *C. acuminatum* does not seem to have been the main element in Lamarck's separation of his species, so typification on this element would be unsatisfactory.

#### ADDITIONAL SPECIES RECORDED

*Calophyllum calaba* L. Sp. Pl. 514. 1753; Bojer, Hort. Maurit. 52. 1837.

Bojer (*loc. cit.*) reported that *Calophyllum calaba* was cultivated at the Jardin du Roi and at Reduit, but I have not seen any material from either Madagascar or the Mascarenes referable to this species. The name *C. calaba* was much confused in the early years of the nineteenth century. The name is correctly applied to a species common in the Caribbean, in Central America, and in parts of South America. This species is characterized by its elliptic to suboblong lamina, which is usually rounded at the apex, and by its shortly pedicelled, rather small flowers with relatively very large anthers. *Calophyllum calaba* has been grown in both India and Ceylon, and Bojer (*loc. cit.*) gave the place of origin as the Antilles, so it is possible that it once was grown on Mauritius. The name *C. calaba* has also been used for *C. inophyllum* and two species now called *C. apetalum* Willd. (from India) and *C. burmannii* Wight (from Ceylon).

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